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## ***Interactive comment on “Environmental impacts of human action in watercourses” by J. S. Antunes do Carmo***

### **Anonymous Referee #1**

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General comments The general idea suggested by the title is very interesting and the overall framework of the discussion paper is also very suggestive. The topic addressed by the manuscript is in the scope of NHESS. Human impacts and their consequences in rivers in terms of morphodynamic response and hazard implications are one of the most interesting research lines at present. That said, I have several concerns about this manuscript: (1) The overall quality of the discussion paper received is quite low for many reasons: poor scientific significance, poor-fair methodology and above all, the lack of references, reflecting (most probably) an unawareness of the core background about the topic. (2) What is the novelty of this work?

In my opinion the paper needs major corrections in its overall scheme and need to improve practically all sections. In particular, it needs to explain better what the contri-

C2368

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Interactive Discussion

Discussion Paper



bution of this work is and its importance in the general framework of this line of research (citing the appropriate and numerous references). As a result of the overall low quality and lack of results, I recommend rejecting this manuscript.

Scientific significance and quality: The main drawback of the paper is, in general terms, poor quality results. The document consists in a theoretical compilation of human impacts in rivers, most of the time without any real scientific research and lacking the possible application to a study area or interesting research results. Practical application in a case study with examples (and results) of each of the human impacts described are missing. The manuscript doesn't represent a substantial contribution to the understanding of human pressures in natural environments such as rivers. All concepts and ideas are well known for many years (see below in detailed comments). Neither a new methodology is presented here. The application of Lane's balance (not cited here as his contribution) is not new (Lane, 1955). Further discussions on this topic have been taken recently by Dust and Wohl (2012; 2013); Huang et al. (2013). Development of Lane's balance and creation of conceptual models (as the author shows in this manuscript) for describing complex river responses by considering various measures of cross-sectional and/or planform geometry was made by Schumm (1969) and recently by others as Huang and Nanson (2000, 2002). None of the above investigations are cited in the manuscript and all of them were considered the beginning of the modern concept of "fluvial metamorphosis". Modern revision of Lane's balance indicates that qualitative equation should be used carefully, especially in complex river responses, as Dust and Wohl (2012) suggest: "Although Lane's relation is useful for describing river responses in terms of channel slope and adjustments of bed material size, the ability of the expression to describe complex river responses that also involve cross-sectional, planform, and/or bedform geometry adjustments is inherently limited because the expression does not include any terms that can explicitly account for these types of channel geometry adjustments. As a result, Lane's original relation cannot account for the changes in cross-sectional geometry that are typically associated with complex reach adjustments, such as those observed and described by numerous in-

C2369

Interactive  
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



investigators (e.g., Schumm et al., 1981, 1984; Pizzuto, 1994; Ryan, 1997; Dominick and O'Neill, 1998; Cohen and Brierley, 2000; Wohl and Dust, 2012)". One of the weak points of the presented manuscript is the lack of references in general. The author gives only 14 references (five of which come from the author himself). Some of the references are not appropriate and the most important background references are omitted as the seminal works of Lane, Schumm, Graf, Grant et al., Kondolf, Petts and Gurnell, Dust and Wohl (see suggested references). Rocha reference cited in text is not in the list. Specific comments The title is too broad. It tries to include all the environmental impacts of human actions, but nothing is said related to biological, sedimentological or water quality aspects among others. I think the author only write about morphodynamic processes. I recommend constraining it and even more, to give a concise title of the real work done (related to sub-section 3.4). Abstract is related only to a broad and ambiguous summary of impacts but no results are shown on it. As is the case with the text is not concise of the work done and the results obtained. Introduction and background are too general. A review of the subjects developed in section 3 would be expected to find in this section. I found here a very few references (2 in the introduction, one of them not cited, and 1 in background). Section 3 (Responses). This section is where I would expect to find the results of research. Instead of this, I checked that sub-sections 3.1, 3.2, 3.3, 3.5 and 3.6 show a series of general information already known by previous research (see references), with no data derived from the research done by the author. In contrast, sub-section 3.4 is very detailed (with results, research and references) and it is the type of results that I expected to find here. If we compare all the sections, the result is very different, and makes the manuscript lacks consistency. I recommend to the author rewrite again and focus in section 3.4, change title and the core of the manuscript in a less wide objective. Especially in this section the author doesn't clearly explain what is his own contribution in relation to previous works. The author does not reach substantial conclusions. Those are not supported by data and results, therefore are a compendium of ideas, many of them well known for a while. References are probably the most important absence in this work. As I said before,

C2370

Interactive  
Comment

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Interactive Discussion

Discussion Paper



the author doesn't give proper credit to previous work. Too much self-citing and little background in research lines related to geomorphology, fluvial dynamics and human pressure. I enclose a suggested selection of a seminal background that I miss in the manuscript:

Lane, E.W., 1955. The importance of fluvial morphology in hydraulic engineering. American Society of Civil Engineers Proceedings Separate 81 (745), 1–17.

Dust, D., Wohl, E., 2012. Conceptual model for complex river responses using an expanded Lane's relation. *Geomorphology* 139–140, 109–121.

Dust, D., Wohl, E., 2013. Response to commentary by Huang et al. regarding "Conceptual model for complex river responses using an expanded Lane's relation" ..., *Geomorphology*, <http://dx.doi.org/10.1016/j.geomorph.2013.09.036>

Graf, W.L. 2006. Downstream hydrologic and geomorphic effects of large dams on American rivers, *Geomorphology*, 79, 336-360.

Grant, G., O'Connor, J.E. and Wolman, G. 2013. A river runs through thought in: conceptual models in fluvial geomorphology. In: E. Wohl (ed), *Treatise on fluvial Geomorphology*. Elsevier. 6-20pp.

Huang, H.Q., Nanson, G.C., 2000. Hydraulic geometry and maximum flow efficiency as products of the principle of least action. *Earth Surface Processes and Landforms* 25, 1–16.

Huang, H.Q., Nanson, G.C., 2002. A stability criterion inherent in laws governing alluvial channel flow. *Earth Surface Processes and Landforms* 27, 929–944.

Huang, H.Q., Liu, X., Nanson, G.C., 2013. Commentary on a 'Conceptual model for complex river responses using an expanded Lane's relation by David Dust and Ellen Wohl'. *Geomorphology* 139–140, 109–121 (March 2012).

Keller, E.A. (1976). Channelization: environmental, geomorphic and engineering as-

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Interactive Discussion

Discussion Paper



pects. In: Geomorphology and engineering. D.R. Coates (Ed). State Univ. of New York and Binghamton, 115-140.

Kondolf, G. M. 1997. Hungry water: effects of dams and gravel mining on river channels. *Environmental Management* 21(4):533-551.

Magilligan, F.J, Nislow, K.H. 2005. Changes in hydrologic regime by dams. *Geomorphology*, 71, 61–78.

Petts, G.E. and Gurnell, A.M. 2005. Dams and geomorphology: Research progress and future directions, *Geomorphology*, 71, 27–47.

Schumm, S.A., 1969. River metamorphosis. *Journal of Hydraulics Division of American Society of Civil Engineers* 95 (HY1), 255–273.

Schumm, S.A., Harvey, M.D., Watson, C.C., 1984. *Incised Channels: Morphology, Dynamics, and Control*. Water Resources Publications, Littleton, CO.

Wohl, E.E. (2000, ed). *Inland Flood Hazards*. Cambridge Univ. Press. 498p.

Wohl, E. 2014. *Rivers in the Landscape: Science and Management*. Wiley-Blackwell, 330pp.

Presentation of manuscript is clear and concise. The general structure is good, in section 3 (responses) with a detailed list of human impacts. Number of figures is adequate, however, quality is poor in many cases (i.e: fig 6 and specially the fig 10). I miss too a summary table with impacts, related changes and case studies around the world (or Portugal) in every human impact type. Figures 8a and 8b are fine, but I miss a figure or general map in which impact is localized within a general river structure. Figs 5,6,7 and 9 are well known, it would be preferable to see here same figures in a case study in Portugal. Paper length is adequate as it is, but if the author improves every section, especially section 3 will be too long. I recommend here to delete sub-sections 3.1, 3.2, 3.3, 3.5 and 3.6 to focus in one or a few human pressures as the mentioned 3.4 sub-section and rename all manuscript in a sort of: "Morphological impact of alluvial

C2372

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Interactive Discussion

Discussion Paper



bed extractions in (case study. . .)”. Unfortunately, I think that the effort to rewrite and restructure the entire manuscript is too big, so I recommend the author dismiss it and begin a new one, trying to focus it more adequately, or keeping the one presented here, but entering data and information product of research.

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 2, 6499, 2014.

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Discussion Paper

C2373

